

FABRICATION METHOD OF YB BASED OXIDE MATRIX FOR CMC

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Key Words: 1400°C class CMC. Hot section. Ytterbium Silicate. MI. exposure test.

CMC(Ceramic matrix composite) is expected to improve heat resistance of the jet engine material for hot section.

To Obtain the reliability at the high temperature, it is important that protection of SiC fiber and interface from engine gas flow which contains vaporized water.

In this study, we examined manufacturing method for oxide matrix which expected to withstand 1400°C engine environment. Ytterbium-silicates have been already known as EBC materials having high resistance in engine gas environment. We succeeded to make dense ytterbium-Silicate matrix inside CMC by applying MI (Melt Infiltration) method using Yb containing glass. Reacted region was made by crystalized Yb_2SiO_5 , $\text{Yb}_2\text{Si}_2\text{O}_7$ and $\text{Yb}_3\text{Al}_5\text{O}_{12}$ phases. Developed CMC was evaluated to measure residual strength after exposure test and material test at 1400°C. Strength degradation of this material exposed under pressurized steam condition at 1400°C for 500Hrs was only 12% compared with the one of raw CMC. We confirmed strength properties through tensile test, LCF, Creep from room temperature to 1400°C. The strength properties degradation by the oxide matrix was not seen.

We conducted engine demo testing for turbine shrouds applying developed CMC and EBC. This test was successfully completed.

These results are parts of the study conducted with cooperation of NEDO(New Energy and Industrial Technology Development Organization).